

CLAIMS

What is claimed is:

- 1 1. A dual magnetic tunnel junction head, comprising:
 - 2 a free layer;
 - 3 first and second antiparallel (AP) pinned layer structures positioned on opposite
 - 4 sides of the free layer, each of the AP pinned layer structures including at
 - 5 least two pinned layers having magnetic moments that are self-pinned
 - 6 antiparallel to each other, the pinned layers being separated by an AP
 - 7 coupling layer;
 - 8 a first barrier layer positioned between the first AP pinned layer structure and the
 - 9 free layer;
 - 10 a second barrier layer positioned between the second AP pinned layer structure
 - 11 and the free layer;
 - 12 wherein the head does not have an antiferromagnetic layer.
- 1 2. A head as recited in claim 1, wherein the free layer includes a layer of NiFe.
- 1 3. A head as recited in claim 2, wherein the free layer further includes layers of
2 CoFe sandwiching the layer of NiFe.

- 1 4. A head as recited in claim 1, wherein the AP pinned layer structures have about
2 the same magnetic thickness.
- 1 5. A head as recited in claim 1, wherein the free layer has a thickness of less than
2 about 30Å.
- 1 6. A head as recited in claim 1, wherein the free layer has a thickness of between
2 about 15 and 25Å.
- 1 7. A head as recited in claim 1, wherein a half voltage of the head is more than two
2 times greater than a half voltage of a head having a substantially similar structure
3 but having only one barrier layer.
- 1 8. A head as recited in claim 1, wherein the head has a thickness of less than about
2 500Å.
- 1 9. A head as recited in claim 1, wherein the head has a thickness of less than about
2 300Å.
- 1 10. A dual magnetic tunnel junction head, comprising:
2 a free layer having a thickness of less than about 30Å;
3 first and second antiparallel (AP) pinned layer structures positioned on opposite
4 sides of the free layer, each of the AP pinned layer structures including at

5 least two pinned layers having magnetic moments that are self-pinned
6 antiparallel to each other, the pinned layers being separated by an AP
7 coupling layer;
8 a first barrier layer positioned between the first AP pinned layer structure and the
9 free layer;
10 a second barrier layer positioned between the second AP pinned layer structure
11 and the free layer;
12 wherein the head has a thickness of less than about 500Å.

1 11. A head as recited in claim 10, wherein the free layer includes a layer of NiFe.

1 12. A head as recited in claim 11, wherein the free layer further includes layers of
2 CoFe sandwiching the layer of NiFe.

1 13. A head as recited in claim 10, wherein the AP pinned layer structures have about
2 the same magnetic thickness.

1 14. A head as recited in claim 10, wherein the free layer has a thickness of less than
2 about 30Å.

1 15. A head as recited in claim 10, wherein the free layer has a thickness of between
2 about 15 and 25Å.

1 16. A head as recited in claim 10, wherein a half voltage of the head is more than two
2 times greater than a half voltage of a head having a substantially similar structure
3 but having only one barrier layer.

1 17. A head as recited in claim 10, wherein the head has a thickness of less than about
2 300Å.

1 18. A head as recited in claim 10, wherein the head does not have an
2 antiferromagnetic layer.

1 19. A magnetic storage system, comprising:
2 magnetic media;
3 at least one head for reading from and writing to the magnetic media, each head
4 having:
5 a sensor having the structure recited in claim 1;
6 a writer coupled to the sensor;
7 a slider for supporting the head; and
8 a control unit coupled to the head for controlling operation of the head.

1 20. A magnetic storage system, comprising:
2 magnetic media;
3 at least one head for reading from and writing to the magnetic media, each head
4 having:

- 5 a sensor having the structure recited in claim 10;
- 6 a writer coupled to the sensor;
- 7 a slider for supporting the head; and
- 8 a control unit coupled to the head for controlling operation of the head.